Longitudinal Association of Health Literacy with Parental Oral Health Behavior

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ABSTRACT

Background: Prior studies suggest that parents with limited health literacy (HL) may be less likely to engage in oral health practices known to protect children's oral health. Earlier work has relied on cross-sectional data, however, so it is unclear whether HL influences parental behavior or is merely correlated with it. **Objective:** We sought to clarify the impact of HL on subsequent adherence to parental oral health practices. **Methods:** This secondary analysis used survey data from a randomized controlled trial designed to reduce dental decay in American Indian children (*N* = 579). We used path analysis to test a theoretical framework developed to clarify the mechanisms through which HL might influence parental oral health behavior. The framework proposed that HL (1) has a direct effect on parental oral health knowledge, beliefs (i.e., self-efficacy, perceived susceptibility, perceived severity, perceived barriers, perceived benefits), and behavior; (2) has an indirect effect on beliefs through knowledge; and (3) has an indirect effect on behavior through knowledge and beliefs. To test expectations regarding the temporal precedence of the constructs, we examined the association of HL at baseline with knowledge at the 12-month time point, beliefs at 24 months, and behavior at 36 months. **Key Results:** HL had significant direct effects on knowledge and specific beliefs (i.e., self-efficacy, perceived susceptibility, perceived barriers), but not on behavior. HL had significant indirect effects on beliefs—except perceived susceptibility—through knowledge. HL had significant indirect effects on behavior, through knowledge and beliefs. Both HL and knowledge had significant total effects on subsequent parental oral health behavior. **Conclusions:** HL influenced behavior measured 3 years later through its impact on parental oral health knowledge and beliefs. Our results highlight the importance of addressing HL in development of oral health promotion efforts aimed at protecting the teeth of young Native children. [***HLRP: Health Literacy Research and Practice***. **2021;5(4):e333-e341.]**

Plain Language Summary: It is unclear whether HL influences how parents care for their children's teeth. We analyzed data from a project to reduce dental decay in children. We found that HL impacted parents' oral health knowledge, beliefs, and behavior at later points in time. This suggests that HL may influence development of knowledge and beliefs that support positive behavior.

Research suggests that children's oral health may be impacted by parental health literacy (HL). Parents with weaker HL have more limited knowledge of pediatric oral health (Brega et al., 2016; Brega et al., 2020; Vann et al., 2010; Vilella et al., 2016) and hold suboptimal oral health beliefs (Brega et al., 2016; Brega et al., 2020). Perhaps as a consequence, parents with lower HL are often less likely to engage in recommended oral health behaviors (Brega et al., 2016; Vann et al., 2010).

Although the literature reports an association between HL and parental oral health behavior, little is known about the mechanisms contributing to this relationship. Moreover, because prior research has mainly employed cross-sectional methods, it is unclear whether limited HL is merely correlated with suboptimal behavior or whether it serves as a barrier to development of optimal oral health practices. The objective of this analysis was to assess the longitudinal influence of parental HL on parental oral health behavior.

We tested a theoretical framework designed to clarify the pathways linking HL to parental oral health behavior **(Figure 1)**. Development of the framework was guided by HL research and theory (Brega, Ang, et al., 2012; Lee et al., 2016; Osborn et al., 2011; Paasche-Orlow et al., 2005; Sørensen et al., 2012; Wolf et al., 2007), as well as health behavior theory (i.e., the expanded Health Belief Model [EHBM]) (Janz & Becker, 1984). The framework proposes that parental HL influences subsequent parental oral health behavior both directly and indirectly through parental oral health knowledge and beliefs. Three main hypotheses are outlined in the framework:

1. HL has direct effects on subsequent knowledge, beliefs, and behavior, such that stronger HL is associated with better knowledge, greater endorsement of beliefs expected to encourage positive oral health behavior, and greater adherence to recommended behaviors.
2. HL has indirect effects on beliefs through knowledge, such that stronger HL is linked to better knowledge, leading to more optimal beliefs.
3. HL has indirect effects on behavior through knowledge and beliefs, such that stronger HL is linked to greater knowledge and more optimal beliefs, leading to better behavioral adherence.

To test these hypotheses, we conducted a path analysis using data from a randomized controlled trial designed to reduce dental decay in American Indian children. Native children in the United States experience dental decay at a rate far higher than their non-Native counterparts (Indian Health Service, 2013; Phipps & Ricks, 2015; Phipps et al., 2012; South Dakota Department of Health, 2014). Among 3- to 5-year-olds, 71% of Native children have experienced dental decay, compared to 25% of non-Hispanic White children (Phipps et al., 2019). Use of longitudinal data allowed us to test the framework's expectations regarding the temporal precedence of the constructs (i.e., the association of earlier HL with later knowledge, beliefs, and behavior). As the first known test of a theoretical framework to investigate the longitudinal relationship of parental HL with parental oral health behavior, this analysis provides new insight into the role of parental HL in pediatric oral health.

METHODS

Participants and Procedures

We used data from the study entitled *Promoting Behavioral Change for Oral Health in American Indian Mothers and Children* (PBC) (Batliner et al., 2014; Batliner et al., 2018). The PBC study tested an intervention to reduce dental decay among American Indian children from a specific

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Northern Plains tribe. Although dental decay is common among Native children in the Northern Plains (Batliner et al., 2013; Batliner et al., 2018; South Dakota Department of Health, 2014; Warren et al., 2016), access to dental care is limited on the reservation. For a population of 20,000 people (United States Census Bureau, n.d.), there are only three dental clinics and one dentist for every 4,000 residents (Batliner et al., 2018).

As part of the trial, 579 parent-child dyads were recruited, randomized to a control or intervention group, and observed for 3 years (Batliner et al., 2014; Batliner et al., 2018). Pediatric participants were required to be American Indian, age 0 to 3 months, and residing on or near the reservation. Children with medical conditions that could impair tooth development were excluded. Participating adults were required to be the mother or primary caregiver of the child, age 15 to 65 years, willing and able to follow the study protocol, and able to provide informed consent.

Approval for this secondary analysis and the original trial was obtained from the institutional review boards of the participating tribe and the University of Colorado Anschutz Medical Campus. Parents provided informed consent and HIPAA authorization prior to participation. For parents younger than age 18 years, investigators obtained consent from parents or legal guardians.

Measures

Parents completed the Basic Research Factors Questionnaire (Albino et al., 2017) at enrollment, when children were newborns, and when children were age 12, 24, and 36 months. All measures reported have been validated in Native people (Brega, Jiang, et al., 2012; Wilson et al., 2014; Wilson et al., 2016; Wilson et al., 2018).

Health Literacy. Three items assessed parents' confidence in reading and completing medical forms. These items were adapted from screening questions known to accurately identify patients with limited HL (Chew et al., 2004; Chew et al., 2008; Sarkar et al., 2011; Wallace et al., 2007; Wallace et al., 2006). The HL score was the mean of these items and ranged from 1 to 5, with larger numbers indicating stronger HL (baseline mean [*M*] = 3.9, standard deviation [*SD*] = 0.8).
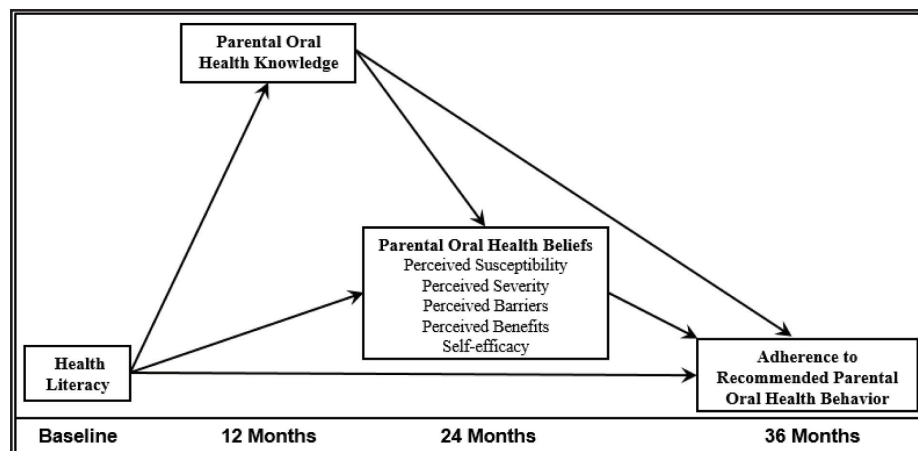

Figure 1. Theoretical framework clarifying the pathways linking health literacy with parental oral health behavior.

Parental Oral Health Knowledge. Seventeen items assessed parents' knowledge of pediatric oral health (e.g., "Cavities are caused by germs in the mouth") and recommended parental oral health behaviors (e.g., "At what age should a child first have his/her teeth checked by a dentist or doctor?"). We coded participant responses as *correct* or *incorrect*, categorizing *don't know* as an incorrect response. The knowledge score was the percentage of questions answered correctly using data from the 12-month time point (*M* = 79, *SD* = 12.6).

Parental Oral Health Beliefs. According to the EHBM, parents are more likely to follow recommended parental oral health practices to the extent that they believe their children are susceptible to dental decay, that dental decay is a severe outcome, that there are few barriers to and many benefits of recommended practices, and that they personally can successfully engage in these behaviors (i.e., self-efficacy) (Janz & Becker, 1984). Perceived susceptibility, severity, barriers, and benefits were assessed using 2 to 5 items each. The score for each construct was the mean of relevant items and used a scale of 1 to 5, with larger numbers reflecting greater endorsement of the construct. Means for each construct at 24 months were as follows: susceptibility (*M* = 2.8, *SD* = 1.1), severity (*M* = 4.4, *SD* = 0.8), barriers (*M* = 2.1, *SD* = 0.8), and benefits (*M* = 4.4, *SD* = 0.7).

Fourteen items assessed parents' confidence that they could engage in specific parental oral health behaviors. There was a ceiling effect in response to these items, with participants often selecting the highest possible score (5 on the 1 to 5 scale). As a result, an overall self-efficacy score computed as the mean of these items was highly skewed (skew = −1.81). Therefore, consistent with our prior research (Brega et al., 2020), the self-efficacy score was computed as the number of items for which

the highest score was chosen. At the 24-month time point, the score had a range from 0 to 14 ($M = 7.9$, $SD = 4$; skew = −0.67).

Parental Oral Health Behaviors. Thirteen items assessed adherence to recommended oral health behaviors (e.g., "When your child's teeth are brushed, is fluoride toothpaste usually used?"). We coded participant responses as being adherent or nonadherent with recommended parental oral health behaviors (American Academy of Pediatric Dentistry, 2016a, 2016b). Using 36-month data, we computed overall behavioral adherence as the percentage of recommended behaviors for which a parent was adherent ($M = 52.1$, $SD = 20$).

Sociodemographic Characteristics. We report sociodemographic characteristics of parents (i.e., age, sex, race, tribal affiliation, educational attainment, household income for the prior year, and employment status) and children (i.e., age, sex, and race).

DATA ANALYSIS
Descriptive Analyses

Descriptive analyses were conducted for all variables, including means and standard deviations (SDs) for continuous variables and frequencies (percentages) for categorical variables. To examine bivariate relationships, Pearson's correlations were calculated among all constructs in the theoretical framework **(Table A)**.

Path Analysis

Path analysis was used to test the theoretical framework. Analyses were performed in R (version 3.6.3) (R Core Team, 2020), using the lavaan package (version 0-6.5) (Rosseel, 2012). To make use of all available data, full information maximum likelihood was used.

Because intervention differences were not hypothesized, we planned to combine the intervention and control groups in the analysis. To confirm this approach was appropriate, we began the analytic process by evaluating the impact of treatment arm on model conclusions. First, we estimated the theoretical model using a multiple-group analysis, in which the model was fitted simultaneously in both the intervention and control groups, allowing for group differences. A second model was then estimated in which all parameters were constrained to be the same in both groups. A likelihood ratio test indicated that path relationships were not significantly different between the two models. Hence, we present the more parsimonious model, which constrained parameter estimates to be the same in both treatment arms.

In this final model, we examined direct, indirect, and total effects. Indirect effects were calculated using the prod-

uct of coefficients method, with standard errors for indirect and total effects derived from bias-corrected bootstrapping with 5,000 iterations. We included parent age, education (high school degree or less vs college degree or more), and household income (<$10,000, $10,000-$20,000, >$20,000, or missing) as predictors of HL. We estimated residual correlations among the five EHBM constructs.

After computing the path model, we carried out sensitivity analyses to ensure the robustness of model estimates and to explore potential moderator effects of the covariates on the relationship of HL with the endogenous constructs in the model (e.g., knowledge, beliefs, behavior). In the first sensitivity analysis, the three covariates (i.e., age, education, and income) were modeled as predictors of each endogenous construct with which HL had a significant relationship and of the potential mediators of those significant relationships. After including the covariates as potential confounders, we observed no changes that affected model conclusions (i.e., the significance of the relationships tested in the path model did not change). In a second sensitivity analysis, we undertook an exploratory post hoc analysis to examine potential interactions between the covariates and HL in predicting the endogenous constructs. Specifically, we conducted regression analyses that predicted each endogenous variable based on HL, one of the covariates, and the interaction of HL with that covariate. Because the 21 statistical tests conducted were not specified a priori, we applied a modest correction for alpha inflation (i.e., 0.05/3 for the three covariates for a significance level of 0.017). Across all regression analyses, there was no evidence of significant interactions between HL and the covariates. As a result of these sensitivity analyses, we retained our original path model, wherein the covariates only predicted HL, as a more parsimonious test of the theoretical framework.

We assessed the fit of the model using model chi-square, comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR) (Hu & Bentler, 1999; Lai & Green, 2016; Schreiber, 2008). We used the following criteria as indicators of good model fit: nonsignificant chi-square value, CFI value ≥0.95, and RMSEA and SRMR values ≤0.05 (Hu & Bentler, 1999).

Statistical Power

Although this project involved secondary analysis of existing data, we conducted an a priori power analysis prior to estimating the reported models. Power calculations considered overall model fit and the size of specific paths, where the latter was estimated in Mplus using Monte Carlo sim-

ulation (Muthén & Muthén, 2002). The sample size provided more than 95% power to compare a close-fitting model (RMSEA = 0.05) to an alternative model having less acceptable fit (RMSEA = 0.07) (MacCallum et al., 1996). Additionally, we had more than 90% power to detect even small effects (i.e., $R^2 < 0.02$) for the estimated path coefficients.

Figure 2. Direct effects tested in the path model. *$p < .05$, **$p < .01$, ***$p < .001$. Figure presents standardized coefficients for all direct paths.

RESULTS

Sample Characteristics

At baseline, the mean age of parents was 25 years. Most were women (97.2%) and were the mothers of participating children (95.9%). Nearly all parents were American Indian (95.2%) and most were members of the participating tribe (73.7%). At enrollment, children were age 3 weeks, on average, and were evenly divided by sex. Socioeconomic limitations were common, with 40.1% of parents reporting they had not finished high school and more than one-half reporting being unemployed (50.3%) and having an annual household income <$10,000 (51.1%).

Model Fit

The final model demonstrated good fit with the data, as indicated by SRMR (0.04), RMSEA (0.04), and CFI (0.96). Although the chi-square test was significant ($\chi^2(35, N = 579) = 67.5, p < .01$), this result was not unexpected, as this test is sensitive to sample size (Hooper et al., 2008).

Path Analysis

Direct Effects. Hypothesis 1 predicted that baseline HL would have significant direct effects on subsequent knowledge, beliefs, and behavior. HL had a significant direct effect on knowledge **(Figure 2)**. As shown in **Figure 2** and **Table 1**, it also had significant direct effects on three oral health beliefs (i.e., self-efficacy, perceived susceptibility, perceived barriers). Stronger HL was associated with better knowledge as well as stronger self-efficacy and lower perceived barriers. HL was negatively associated with perceived susceptibility, such that parents with stronger HL perceived their children to be less susceptible to dental decay. HL did not have significant direct effects
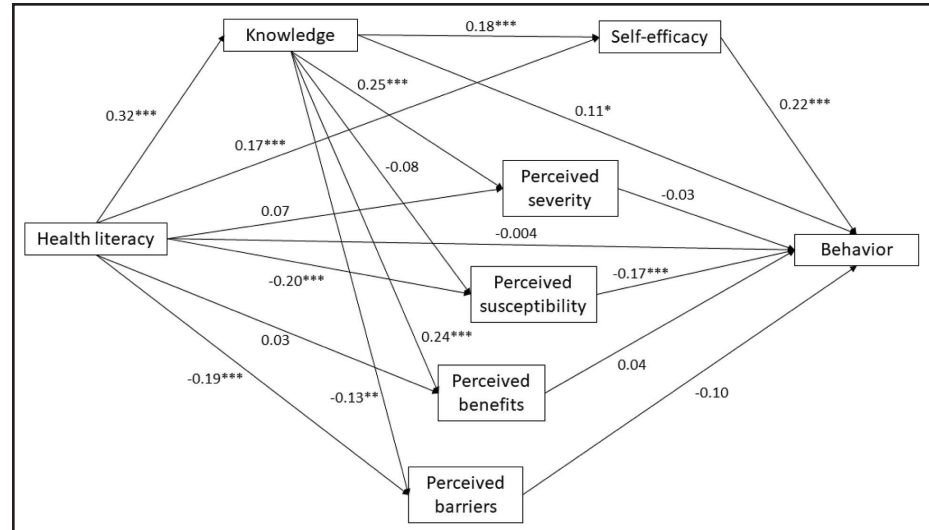
on perceived severity or benefits **(Figure 2** and **Table 1)** or on behavioral adherence **(Figure 2)**.

Figure 2 presents all other estimated direct effects. Parents with greater knowledge had significantly higher self-efficacy, perceived severity, and perceived benefits; significantly lower perceived barriers; and significantly better behavioral adherence. There was not a significant relationship between knowledge and perceived susceptibility.

Two of the parental oral health beliefs (i.e., self-efficacy and perceived susceptibility) had significant direct effects on behavior **(Figure 2)**. Parents with greater self-efficacy had significantly stronger behavioral adherence. Parents who perceived their children to be more susceptible to cavities were less likely to engage in recommended behaviors. Perceived severity, benefits, and barriers did not have significant direct effects on behavior.

Indirect Effects. Hypothesis 2 proposed that there would be significant indirect effects of HL on beliefs through knowledge. As shown in **Table 1**, HL had significant indirect effects on all beliefs—except perceived susceptibility—through knowledge. Parents with stronger HL had greater knowledge, leading to more optimal beliefs. Combining the direct effects of HL on beliefs with the indirect effects through knowledge, HL had significant total effects on all EHBM constructs.

Hypothesis 3 proposed that HL would have indirect effects on behavior through knowledge and beliefs. As summarized in **Table 2**, HL had significant indirect effects on behavior through knowledge, perceived susceptibility, and self-efficacy. Parents with stronger HL had

TABLE 1

Indirect Effect of Health Literacy on Beliefs Through Knowledge

Construct	Direct Effect of HL on Construct[a]			Indirect Effect of HL on Construct Through Knowledge[b]			Total Effect of HL on Construct[c]		
	Estimate	95% CI	p Value	Estimate	95% CI	p Value	Estimate	95% CI	p Value
Perceived susceptibility	−0.26	[−0.38, −0.13]	<.001	−0.04	[−0.08, 0.00]	.106	−0.29	[−0.41, −0.17]	<.001
Perceived severity	0.07	[−0.03, 0.16]	.169	0.08	[0.04, 0.12]	<.001	0.15	[0.05, 0.24]	.002
Perceived barriers	−0.17	[−0.26, −0.08]	<.001	−0.04	[−0.07, −0.01]	.012	−0.21	[−0.29, −0.13]	<.001
Perceived benefits	0.03	[−0.07, 0.12]	.550	0.07	[0.04, 0.12]	.001	0.10	[0.01, 0.19]	.031
Self-efficacy	0.85	[0.37, 1.32]	<.001	0.28	[0.13, 0.48]	.001	1.13	[0.69, 1.57]	<.001

Note. CI = confidence interval; HL = health literacy.
[a]Direct effect estimates reflect unstandardized beta coefficients.
[a]Direct effects are the product of direct effects. CIs are calculated with bootstrapped standard errors.
[b]Indirect effects are the product of direct effects. CIs are calculated with bootstrapped standard errors.
[c]Total effects are the sum of direct and indirect effects. CIs are calculated with bootstrapped standard errors.

better knowledge, leading to greater behavioral adherence. Likewise, stronger HL was associated with lower perceived susceptibility and greater self-efficacy, leading to better behavior. HL did not have indirect effects on behavior through perceived severity, barriers, or benefits.

The path model also allowed us to estimate the indirect effect of HL on behavior sequentially through knowledge and then beliefs. Only one significant indirect effect of this nature was found **(Table 2)**. Parents with stronger HL had better knowledge, leading to heightened self-efficacy, ultimately contributing to greater behavioral adherence. Across their direct and indirect effects, both HL (Estimate = 3.54, 95% confidence interval [CI] = 1.32-5.76, p = .002) and knowledge (Estimate = 0.28, 95% CI = 0.13-0.44, p < .001) had significant total effects on behavior.

Covariate Effects. The path model included three covariates—age, education, and income—as predictors of HL. We observed significant, positive relationships of age (β = 0.19, p < .001) and education (β = 0.19, p < .001) with HL, such that older participants and those with higher educational attainment had higher levels of HL. There were no differences in HL between the three income categories of >\$20,000 (β = 0.04, p = .26), \$10,000-\$20,000 (β = 0.04, p = .32), and missing (β = 0.08, p = .07) relative to the lowest-income reference group (<\$10,000).

DISCUSSION

Results provided substantial support for our theoretical framework. Consistent with Hypothesis 1, baseline HL was directly associated with subsequent knowledge and beliefs (i.e., self-efficacy, perceived barriers, perceived susceptibility). As proposed in Hypothesis 2, baseline HL significantly influenced subsequent oral health beliefs (except perceived susceptibility) through knowledge. Finally, although HL did not directly impact behavior at 36 months, it significantly influenced behavior through improved knowledge and beliefs (Hypothesis 3).

Our findings are consistent with prior research examining the role of parental HL in children's oral health. Earlier studies, which have mainly used cross-sectional methods, have shown that stronger HL is associated with better knowledge of pediatric oral health (Brega et al., 2016; Brega et al., 2020; Vann et al., 2010; Vilella et al., 2016) and with parental oral health beliefs expected to be conducive to positive health behavior (Brega et al., 2016; Brega et al., 2020). The current analysis extends these findings by showing that baseline HL influences knowledge a year later and specific beliefs two years later. This work suggests that HL may facilitate development of optimal oral health knowledge and beliefs.

TABLE 2

Indirect Effect of Health Literacy on Behavior Through Knowledge and Beliefs[a]

Construct	Indirect Effect of HL on Behavior Through Construct			Indirect Effect of HL on Behavior Through Knowledge to Construct		
	Estimate	95% CI	*p* Value	Estimate	95% CI	*p* Value
Knowledge	0.85	[0.12, 1.85]	.047	-	-	-
Perceived susceptibility	0.83	[0.32, 1.57]	.008	0.11	[−0.01, 0.34]	.171
Perceived severity	−0.05	[−0.41, 0.08]	.630	−0.06	[−0.29, 0.12]	.559
Perceived barriers	0.46	[0.02, 1.12]	.095	0.10	[0.01, 0.30]	.137
Perceived benefits	0.03	[−0.07, 0.41]	.738	0.08	[−0.09, 0.36]	.451
Self-efficacy	0.96	[0.35, 1.86]	.012	0.32	[0.12, 0.67]	.014

Note. CI = confidence interval; HL = health literacy.
[a]Indirect effects are the product of direct effects. CIs are calculated with bootstrapped standard errors.

Although some studies have shown a significant association of HL with parental oral health behavior (Brega et al., 2016; Vann et al., 2010), others have not (Divaris et al., 2014; Miller et al., 2010), an inconsistency that is common in the field of HL research (Berkman et al., 2011). Our results suggest there may be multiple mechanisms through which HL can exert an effect on behavior. In the reported analysis, HL did not have a direct effect on behavior, but still influenced behavior through its impact on knowledge and beliefs. Systematically examining the direct and indirect effects of HL might help investigators better understand the connection between HL and behavior.

In our theoretical framework, we proposed that stronger HL would be associated with oral health beliefs theorized to be conducive to greater behavioral adherence, including a heightened sense of susceptibility. In contrast, we found that parents with stronger HL perceived their children to be less susceptible to dental decay and that parents with lower perceived susceptibility had better behavioral outcomes. Although contrary to the theoretical framework, these findings are consistent with our prior cross-sectional analyses. In that earlier work, we found a significant negative relationship between HL and perceived susceptibility in the PBC sample (Brega et al., 2020) and a significant negative association between susceptibility and behavior in a Navajo sample (Wilson et al., 2018). Parents with stronger HL may have more confidence in their ability to keep their children's teeth healthy, leading to a lower level of perceived susceptibility. Likewise, parents who perceive their children to be highly susceptible may experience oral health fatalism (Finlayson et al., 2007), which may discourage active engagement in recommended behaviors. Further, it is possible that participants who perceived their children to be highly susceptible to oral health problems at 24 months may be the parents of children who have existing dental decay. Although we examined the association of perceived susceptibility with subsequent behavior, our analysis may have captured one phase of a complex cycle in which behavior influences outcomes, which then influence perceived susceptibility. In future analyses, we will seek to clarify the mechanisms explaining the action of perceived susceptibility.

STUDY STRENGTHS AND LIMITATIONS

The reported analysis had important strengths. First, this work was guided by a theoretical framework that drew on prior research and scholarship in health literacy as well as established health behavior theory. Second, use of path analysis allowed examination of direct relationships between HL and the oral health constructs as well as indirect pathways that underlie those associations. Finally, use of longitudinal data allowed us to test expectations about the temporal sequencing of constructs included in the theoretical framework.

This work also had limitations. First, our analysis focused on a single health condition and a single population. The relationship of HL with behavior found here may not be generalizable to other health conditions or populations. Second, although we found that HL was associated with subsequent knowledge, beliefs, and behavior, our analytic approach cannot demonstrate conclusively that HL causes specific changes in these constructs. Third, although we ruled out potential confounding effects of three important demographic pre-

dictors (age, education, and income), the reported analysis relies on the assumption of no unmeasured confounders. In conclusion, our results suggest that HL has important direct and indirect effects on parental oral health knowledge, beliefs, and behavior. As the first known test of a theoretical framework using longitudinal data, this work provides the first indication that HL may have a causal impact on these constructs. Our results highlight the importance of addressing HL, knowledge, and beliefs in oral health promotion efforts aimed at protecting the teeth of young Native children.

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Table A. Pearson's Correlations among Health Literacy & Oral Health Constructs [a]

	Baseline	12 Months	24 Months					36 Months
	Health Literacy	Knowledge	Self-efficacy	Perceived Susceptibility	Perceived Severity	Perceived Barriers	Perceived Benefits	Behavior
Health Literacy	1	0.30***	0.22***	-0.22***	0.14**	-0.23***	0.10*	0.13**
Knowledge	0.30***	1	0.24***	-0.14**	0.27***	-0.19***	0.24***	0.19***
Self-efficacy	0.22***	0.24***	1	-0.22***	0.33***	-0.50***	0.41***	0.34***
Perceived Susceptibility	-0.22***	-0.14**	-0.22***	1	-0.32***	0.41***	-0.17***	-0.27***
Perceived Severity	0.14**	0.27***	0.33***	-0.32***	1	-0.37***	0.33***	0.16***
Perceived Barriers	-0.23***	-0.19***	-0.50***	0.41***	-0.37***	1	-0.31***	-0.30***
Perceived Benefits	0.10*	0.24***	0.41***	-0.17***	0.33***	-0.31***	1	0.19***
Behavior	0.13**	0.19***	0.34***	-0.27***	0.16***	-0.30***	0.19***	1

[a] Figure presents Pearson's correlations among constructs of interest at baseline, 12 months, 24 months, and 36 months. P values are represented with the following symbols: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.